

*Acknowledgements*

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## POST-RELEASE FLIGHT AND FORAGING BEHAVIOR OF A BALD EAGLE HACKED IN WESTERN KENTUCKY

by

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*Abstract*

A Bald Eagle (*Haliaeetus leucocephalus*) hacked at Land Between the Lakes in the summer of 1981, was observed for 113 h from its release until its dispersal from the area. Eighty-three major flights were timed, with an average of one flight per 1.4 h. Longest flight time was nearly 25 minutes, and longest straight line distance covered during any single flight was approximately 3.0 km. Foraging success showed an improvement through time. The eagle exhibited many behaviors similar to other birds of the same age, but appeared to be advanced in the onset of soaring flight and capturing of live fish.

*Introduction*

Hacking is a technique of placing raptors on artificial nesting platforms remote from where they were hatched. They are fed and monitored with a minimum of human contact until capable of flight, when they are released into the wild. The biological premise is that when the birds are sexually mature they will return to the general area from which they were released to nest and raise young (Milburn 1979).

Bald Eagle (*Haliaeetus leucocephalus*) hacking was based on a successful Peregrine Falcon (*Falco peregrinus*) hacking program at Cornell University (Sherrod and Cade 1978). The state of New York pioneered Bald Eagle hacking in 1976 at Montezuma National Wildlife Refuge and has continued the program each year since. In 1980, the first two New York hacked eagles nested and successfully reared two eaglets (Nye 1980). This demonstrated that hacking is a promising means of reestablishing Bald Eagles in their former range.

The Tennessee Valley Authority (TVA) and the Tennessee Wildlife Resources Agency (TWRA) initiated a cooperative Bald Eagle hacking program during the summer of 1980. The goal was to reestablish a population of breeding Bald Eagles in western Kentucky and Tennessee. Bald Eagles formerly nested in this area, but the last documented successful

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nesting at Land Between the Lakes (LBL) occurred in the 1940's (Peterson 1973). Five Bald Eagles have been successfully hacked at LBL during the first 2 years. The eagle in this study was produced and parent-reared in captivity at the Columbus Ohio Zoo.

### *Study Area and Methods*

Land Between the Lakes is a 68,000 hectare (170,000 acres) peninsula located between Kentucky Lake and Lake Barkley in western Kentucky and Tennessee (Fig. 1). There are many bays and coves along the 480 km of relatively undeveloped shoreline which offer seclusion from the main bodies of water and potential Bald Eagle nesting habitat. The hacking site is located along the Prior Bay shoreline of Lake Barkley (Lowe et al. 1981).

Radio telemetry equipment was utilized for short term monitoring of the eagle. The bird was banded with a U.S. Fish and Wildlife Service rivet band and a red plastic band for long term identification.

A small flat boat with an 85 hp motor was utilized for following the eagle. The bird's general location was established with telemetry equipment and pinpointed with 10X binoculars. Once located, a minimum distance of approximately 70 m at a right angle to the shoreline was maintained between the eagle and the boat to avoid forcing any movements and direction of movement. When tracking the eagle in flight a minimum distance of about 0.4 km was maintained for the same reasons. All time periods between dawn and dusk were similarly represented avoiding any time of day bias.

Flights that were observed were timed with a stopwatch; those that lasted more than 15 seconds were considered major flights. A flight was defined as the interval from one perch to another or from the time the eagle was seen in the air until it went out of view. Distance of a flight was determined by plotting perch locations on a topographic map and measuring straight line distance from perch to perch. Flight altitude was estimated. The term range refers to the maximum distance traversed during a particular period.

Foraging methods were observed and the frequency of foraging attempts and successes were quantified. Only those times when the eagle swooped and actually struck the water surface were considered foraging attempts. Foraging success was the percentage of foraging attempts in which a fish was secured.

### *Results*

The eagle was observed for 113 h during which time 83 major flights were timed. The study was divided into four periods based on the eagle's movements: release and the first day, early, intermediate, and late periods.

#### *Release and First Day*

On Tuesday 7 July, the 14.5 week old eagle made its first flight at 0645 (CST), only a few seconds after biologists had removed one side panel from the hacking enclosure. The eagle alternated flapping and gliding without losing altitude and ascended twice. It banked and made several circular patterns as it flew in a southward direction. It landed about 9 m up in a tree with dense foliage that was slightly less than 0.4 km southeast of the hack site in a swampy subimpoundment. Total flight time was 70 seconds, and the altitude varied from 9 to 18 m. The eagle remained on this perch for 2.5 h before taking a second flight, which was similar to the first and lasted 1 min.

In late afternoon, the eagle soared above the tree tops for 4.5 min. and reached an altitude of 80 m. At sunset the bird was in the main section of Prior Bay, 0.8 km from the hack site.

#### *Early period*

This period lasted 3.5 days and was characterized by random movements about the main section of Prior Bay (Fig. 1). The eagle's range was less than 0.8 km, and it was never observed to approach within 0.5 km of the hacking tower. Most flights were short (less than 200 m) along the southern shoreline of Prior Bay or across the mouth of a small cove. All were under 18 m in height and no soaring was observed.

On 9 July, the eagle was observed capturing a live fish. The bird was perched in a shoreline tree about 10.5 m above the water when it suddenly left the perch flying directly towards the water. It struck the water surface about 4.5 m from the shoreline, submerging all but its wings and upper body. It immediately began moving towards the shore by using its wings in a paddling motion. When the eagle reached the shore it hopped onto a fallen log and a fish was observed in its talons.

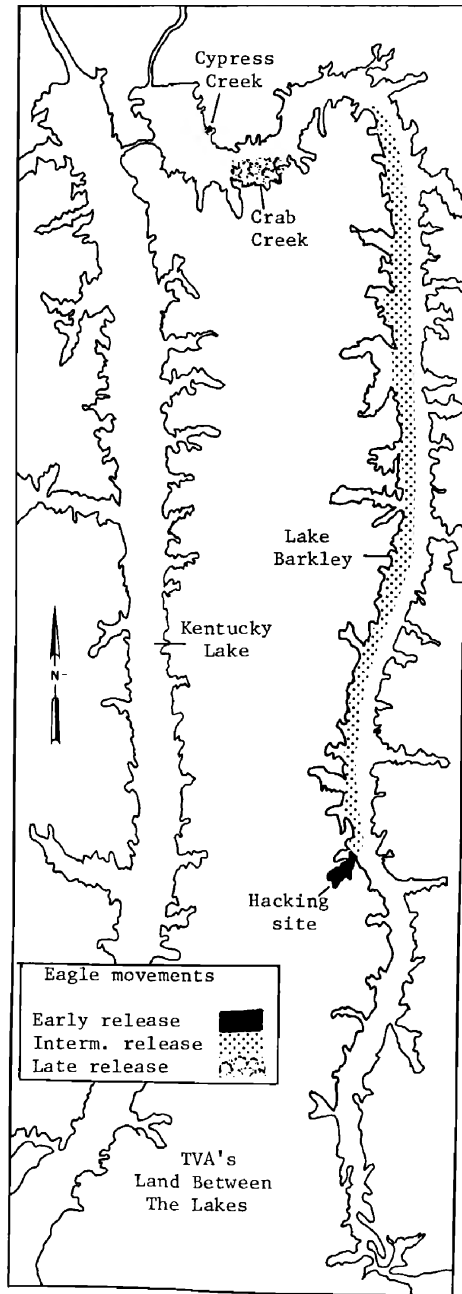


Figure 1. Movements of a fledgling Bald Eagle hacked at LBI..

Although no other prey capture was observed during this period, observation of certain behaviors indicate that the eagle was feeding. These included low altitude foraging searches along the shoreline and walking along the shoreline which could have been scavenging behavior. Foraging success for the period was 33% (1-3).

#### Intermediate Period

This period lasted 4.5 days and was characterized by consistent northward movements until the eagle reached the Crab Creek area of LBL (Fig. 1), some 40 km from the hack site. Although the eagle's circling flights sometimes took it a short distance south, when it finally landed it was always perched north of the previous perch. Its flight path followed the LBL shoreline of Lake Barkley, and use of the many bays along the route was minimal. Flight height usually varied between 3-18 m, and the longest distance was approximately 3.0 km. These movements resulted in an average range of 8.2 km per day.

During this period the eagle was first observed picking up dead fish off the water surface. All successful forages were at the end of lengthy flights of more than 2 min. Foraging success was 50% (8-16).

#### Late period

This period was characterized by a "settling in" as the eagle remained in the Crab Creek area for 29 days. The bird left the area once, when it spent 1 day, 9 August, in the Cypress Creek area (Fig. 1). The eagle's overall range for this period was approximately 2.0 km.

The majority of flights were low altitude foraging searches that involved a great deal of circling as the eagle scanned the water surface below. These were usually under 18 m in height, and covered a distance of less than 0.4 km from perch to perch. Soaring flights were also observed and they were usually along the shoreline where winds sweeping across the lake created an updraft. One in particular, on 21 July, lasted nearly 25 min.

The eagle became very adept at finding and picking up fish on the water's surface as evidence by a foraging success of 76% (16-21). Most feeding perches were just a few feet off the ground on low stumps or snags.

#### Dispersal

It is believed the eagle dispersed from the study area on 15 August. It was last seen on 11 August, but transmitter signals through the 14th indicated that it was still in the Crab Creek area. On 15 August there was no signal in the Crab Creek area or 2 km east or west of there. Several days later surface and aerial searches of both Lake Barkley and Kentucky Lake revealed no transmitter signals.

#### Discussion

The strength of the eagle's first day flights may be related to the age at which the bird was released. In wild nests, when most birds fledge at 11 or 12 weeks of age, first flight is usually a glide onto or near the ground (Harper 1974; Kussman 1977). Milburn (1979) observed similar flights in hacked fledglings and several times had to retrieve them from the ground because they could not attain lift. This problem seems to be avoided by keeping eaglets on the hacking tower an extra 2 or 3 weeks and allowing them to develop greater strength in the flight muscles (Lowe, R.L., per. comm.). The first-day flights of 5 hacked eagles at LBL support this contention. Milburn (1979) first observed soaring in hacked eagles at 3 or 4 weeks after release (15-16 weeks of age). Kussman (1977) intensively studied 8 fledgling Bald Eagles from wild nests and found an average of 32.8 days off the nest (16 weeks of age) before the onset of soaring activity.

It was unusual that the subject eagle was observed successfully hunting on the second day after release. Milburn (1979) observed 7 hacked eagles and did not witness it until 7 or 8 weeks after release (19-20 weeks of age). Harper (1974) never observed hunting behavior in 3 eagles for 20 weeks after they fledged. Kussman's (1977) earliest observation of scavenging was 6.5 weeks after fledging (18.5 weeks of age), and most birds were 5 months old before they exhibited this behavior.

Jaffe (1980) studied the foraging behavior of immature Bald Eagles in mid-summer and found that foraging success in immature eagles increased through time with an overall success rate of 80%. This compares favorably with the 76% foraging success here during the late period.

The condition of fish that the eagle captured was difficult to ascertain. Bald Eagles often take live fish, but being opportunistic feeders they frequently take dead or dying fish if available (Southern 1963; Bent 1961; Herrick 1933; Brown and Amadon 1968; Wright 1953; Broley 1958). Immature Bald Eagles tend to rely more heavily on dead fish than adults (Sherrod et al. 1976). I frequently saw dead fish floating on the surface of the water, and the eagle took these several times. The only instance when the eagle was observed to actually strike beneath the water surface for a fish was on the second day following release.

Movements of juvenile Bald Eagles are not well documented. Only Kussman (1977) and Harper (1974) have dealt with this subject in detail. Bald Eagles usually follow shorelines because of perch sites and fish availability. The methodical northward movement of the eagle in this study ended abruptly when it reached the northern boundary of Lake Barkley. Gerrard et al. (1974) correlated movements of juvenile Bald Eagles with wind direction, but subjective observations by the author indicated that winds were variable throughout this period.

This eagle and the other four hacked at LBL were never observed to return to the hacking tower after being released. All seven of the hacked eagles that Millburn (1979) observed returned regularly to the tower, but two birds hacked in Georgia never returned to the tower (Odum 1980). In wild nests, recently fledged Bald Eagles often return to the nest (Gerrard et al. 1974; Harper 1974), although some do not (Weeks 1975).

The eagle remained in the study area for 39 days after release. This is similar to the observations of Milburn (1979) who recorded variability in the dispersal times of hacked eagles in New York from 3.5 weeks to 14 weeks after release; and to Gerrard et al. (1974) who observed seven immature eagles in Saskatchewan and found that dispersal began at 20-21 weeks of age.

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